

ENVIRONMENTAL ASSESSMENT

A Canal Fish Screen Project

Klamath County, Oregon



A Canal Headworks – Upper Klamath Lake side

Prepared By:

U.S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region
Klamath Basin Area Office
Klamath Falls, Oregon

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Environmental Assessment

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CHAPTER 1 – NEED FOR THE PROPOSAL

INTRODUCTION

The Bureau of Reclamation (Reclamation) proposes to construct and operate a fish screen at the inlet of the A Canal, a feature of the Klamath Project, from Upper Klamath Lake. The fish screen project would include construction of trash rack structure, a fish screen, a headgate facility, two fish bypass pipelines, and other appurtenant features. This environmental assessment (EA) describes the environmental effects of the proposal and alternatives to it.

PURPOSE AND NEED FOR THE PROPOSAL

The purpose of the proposed project is to reduce entrainment (i.e. to draw in or transport by the flow of water) of larval, juvenile and adult endangered Lost River suckers (*Deltistes luxatus*) and shortnose suckers (*Chasmistes brevirostris*) from Upper Klamath Lake (UKL) into the A Canal. There is a need to reduce entrainment because it has been identified as a contributing factor to the present status of the endangered suckers. Reduction of entrainment was originally required by the 1992 long-term Biological Opinion (BO) issued by the U.S. Fish and Wildlife Service (Service), and a letter sent from the Oregon Department of Fish and Wildlife in May 1993.

BACKGROUND

In 1992, the Service issued a BO concerning long-term operations of the Reclamation's Klamath Project (Project) as a result of consultation pursuant to Section 7 of the Endangered Species Act (ESA). The BO acknowledged that sucker entrainment is known to occur in the A Canal. The Service included the following reasonable and prudent alternative (RPA) in the long-term BO because of the concern regarding potential impacts to the sucker population from entrainment.

“Reclamation shall implement a method to reduce entrainment of larval, juvenile, and adult Lost River and shortnose suckers into the A Canal within 5 years of issuance of this BO.” (Service 1992)

In addition, the Service's Draft Recovery Plan for the Lost River sucker and shortnose sucker identifies entrainment reduction at all water diversions as an action to be implemented to assist recovery of the fishes (Service 1993).

In 1995, Reclamation provided a grant to Klamath Irrigation District (KID) (which operates the A-Canal) to conduct a preliminary investigation to assess the impact of sucker losses due to entrainment, and also to determine an appropriate, effective, and practical methodology to reduce any significant losses through the development of many alternatives. Meetings to discuss this issue were held during 1995 and 1996 with Reclamation, KID, the Service, ODFW, Tule Lake Irrigation District (TID), and Cell Tech Natural Resource Scientists, Inc. The group completed a final report on the A Canal fish entrainment issues in 1997. The Upper Klamath Lake Entrainment and Fish Passage Working Group was formed and expanded to include the Klamath Tribes and PacifiCorp to integrate entrainment reduction strategies and associated fish passage issues at Link River Dam. Reclamation then held several meetings from 1997 to 1999 to discuss progress and recommend future activities (Reclamation 2000).

In 1997, the Service requested that Reclamation conduct additional entrainment monitoring of the A Canal to compare with entrainment monitoring data from Link River Dam and B and C Canals. In 1997 and 1998, Reclamation funded an A Canal fish entrainment monitoring study (Gutermuth et al. 2000), and Reclamation's Denver Technical Service Center collected field hydraulic data in

the Link River near the A Canal in preparation of development of a physical hydraulic model (Wahl 1999, as cited by Reclamation 2000).

Reclamation received an amendment to the 1992 BO regarding A Canal sucker entrainment reduction in April 1998. The Service granted Reclamation a five-year extension to reduce entrainment because of the significant progress made in seeking methods to reduce sucker entrainment in the A Canal (Reclamation 2000). The extended period ends in July 2002.

KID has formulated a conceptual plan to screen the A Canal headworks with flat-plate screens and a fish bypass's to UKL and downstream of Link River Dam (Vogel 1999). A meeting held in Portland, Oregon on July 29, 2000 with the natural resource agencies, provided the concurrence and approval to Reclamation and KID to proceed with the flat-plate screen/fish bypass concept. Screen design criteria were also formulated during this meeting and were incorporated into the Service's *April 2001 Biological Opinion, Appendix I*. Subsequent to this meeting, Reclamation provided a grant to KID to develop a preliminary engineering design for the proposed fish screens.

Montgomery-Watson, Inc. was selected by KID to perform the preliminary engineering designs for the alternatives developed. In February of 2001, KID and Montgomery-Watson, Inc. presented Reclamation with a Draft Feasibility Study for the A Canal Fish Screen. Reclamation then contracted with Montgomery-Watson, Inc. for final designs of the project. Montgomery-Watson, Inc. produced an addendum to the February 2001 Feasibility Study in December 2001.

In addition to the ESA, the ODFW has the legal authority for requiring fish screening devices under Oregon statute 498.2.48. In May 1993, ODFW notified Reclamation of the state's statutory responsibility for screening the A Canal. The ODFW's assessment was based on the fact that the A Canal is a large diversion that may adversely impact the trout and endangered sucker populations in UKL. Therefore, ODFW considered the A Canal as a high priority water diversion in the state requiring fish screening devices.

LOCATION AND GENERAL DESCRIPTION OF A CANAL HEADWORKS

General Description

A Canal Headworks

A Canal headworks facilities are located on Upper Klamath Lake (UKL), west of the city of Klamath Falls, Oregon, approximately 1700 feet north of Link River Dam. Both are located in Section 30, Township 39 South, Range 9 East, WM, and in Section 19, Township 39 South, Range 10 East, WM. (Figures 1 & 2) (Project 2000)

Completed in 1907, the A Canal was the first irrigation facility completed on the Klamath Project. It supplies irrigation water, either directly or indirectly through return flows, to the majority of the Project. This canal spans nine miles from UKL into the Klamath Basin. (Project 2000)

A Canal headworks facilities include the headworks and a measurement structure. The headworks are comprised of six bays housing sluice gates that are five feet wide, and eleven feet tall. A single motor lifts the gates in tandem which releases water from UKL into the A Canal. A log boom protects the gates from floating debris. The concrete piers have deteriorated over time, and it is reported that the gate seals leak at a rate of about five cubic-feet-per-second (cfs).

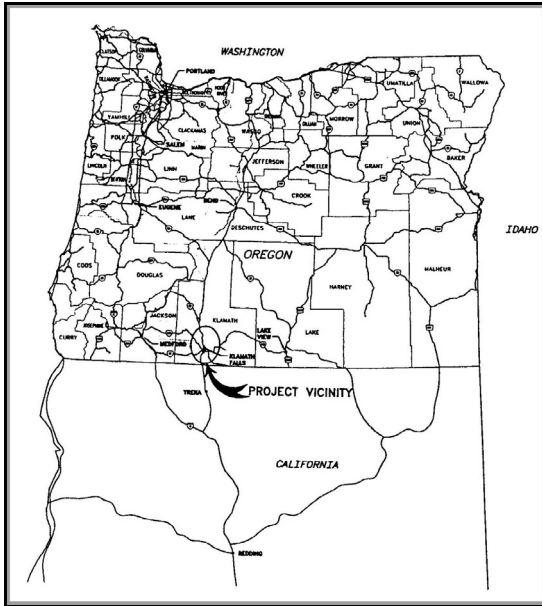


Figure 1: General Location Map

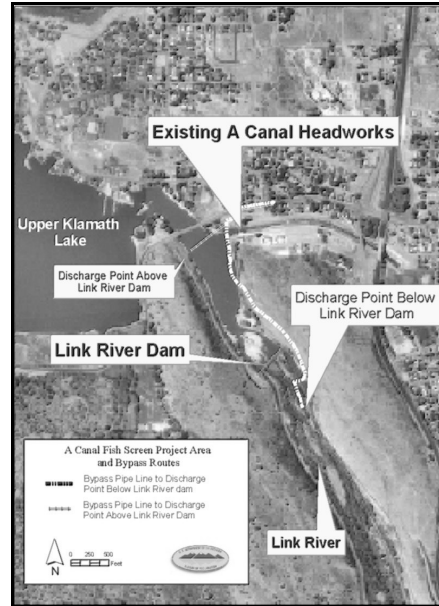


Figure 2: A Canal Fish Screen Project Area and Bypass Pipeline Routes.

In the early 1980's, Reclamation constructed a measurement ramp flume in the A Canal approximately 550 feet downstream of the headworks. The ramp flume created a backwater effect that required the concrete lining be raised approximately twelve to eighteen inches. This higher operational water surface in the canal reduced the amount of water that could enter the canal at low lake water levels.

Link River Dam

The Link River Dam was completed in 1921. The dam is owned by Reclamation and operated by PacifiCorp. Headworks are located near each abutment of the dam; the east headworks control flows to a canal that leads to the intake of PacifiCorp's twelve-foot diameter wood-stave penstock, and the west headworks feed water to the Keno Canal. The spillways located between the two headworks allow the Link River to flow over the dam. (Figure 3)

A fish ladder currently occupies spill bay 24, on the east side of the Dam. However, this ladder was constructed in 1926 and was designed for Red Band Trout and suckers are unable to navigate the ladder. Therefore, a draft feasibility study was completed in May 2001 to replace the existing fish ladder.

PURPOSE OF EA

The purpose of this EA is to describe the environmental consequences of constructing and operating a fish screen/bypass system for the A Canal. Reclamation, as a Federal agency, is required to prepare an EA to comply with the procedural requirements of the National Environmental Policy Act of 1969 (NEPA). This EA will be used to determine whether to prepare a Finding of No Significant Impact (FONSI) or prepare an Environmental Impact Statement. This EA will also assist in selection of an alternative for implementation. If the EA shows that the environmental consequences do not have a significant impact on the human environment, a FONSI will be prepared. If the EA indicates that the proposed action constitutes a major federal action significantly affecting the quality of the human environment, then a Notice of Intent to prepare a draft EIS will be published in the Federal Register.



Figure 3: Link River Dam, taken from west bank, looking north toward Upper Klamath Lake.

DECISIONS TO BE MADE

Reclamation will use this EA and other relevant information to make the following decisions regarding the installation of a fish screen in the A Canal: (1) Should Reclamation install a fish screen/bypass system?; (2) How should Reclamation install the fish screen/bypass system?; and (3) Does the proposed action constitute a major federal action significantly affecting the quality of the human environment necessitating preparation of an environmental impact statement?

PERMITS AND AUTHORIZATIONS NEEDED

Reclamation would obtain the following permits and authorizations to implement the proposed action as displayed in Table 1.

**Table 1 – Permits and Authorizations Needed
A Canal Fish Screen Installation**

Authority	Permit/Authorization Needed	Responsible Agency
Clean Water Act	Section 401-Water Quality Certification	Oregon Department of Environmental Quality
Clean Water Act	Section 402-National Pollutant Discharge Elimination System Permit	Oregon Department of Environmental Quality
Clean Water Act	Section 402-Stormwater Discharge Permit	Oregon Department of Environmental Quality
Clean Water Act	Section 404-Permit to Discharge Dredged or Fill Material into the Waters of the United States	U.S. Army Corps of Engineers
ORS 196.800-990	Removal-Fill Permit	State of Oregon Division of State Lands

SIGNIFICANT RESOURCE ISSUES

The following resource issues have been identified as the significant issues that should be analyzed in detail in this EA. They were identified through scoping activities conducted by Reclamation, and will be used to guide analysis of environmental consequences.

The resource issues are briefly summarized in the following analysis questions:

1. Cultural Resources – How would the proposed action and alternatives affect cultural resources and the historic properties of the headworks?
2. Threatened and Endangered Species – How would the proposed action and alternatives affect any federally listed threatened or endangered species in the proposed areas?
3. Wetland and Riparian Areas – How would the proposed action and alternatives affect the vegetation (wetland and riparian) and wildlife habitats/populations within the proposed areas?
4. Recreational Uses (Nature Trail, boating, etc.) – How would the proposed action and alternatives affect recreational use/facilities within the area? How would the proposed action and alternatives affect visitor experiences within the area?
5. Irrigation Use – How would the proposed action and alternatives affect irrigation activities?
6. Construction-related effects – How would the proposed action and alternatives affect soils, noise, air quality, water quality, dust pollution, traffic, and public safety during construction activities?
7. Other Resources and Issues – How would the proposed action and alternatives affect these resources and issues? (Indian Trust Assets, Environmental Justice, etc.)

CHAPTER 2 PROPOSED ACTION AND ALTERNATIVES

ALTERNATIVE DEVELOPMENT

Reclamation considered alternative courses of action to satisfy the need for reducing entrainment of endangered suckers into the A Canal. The alternatives were evaluated for their technical, economic, and environmental feasibility. They were also evaluated in regard to how well they met the need for the project and addressed the significant resource issues described in Chapter 1. The following section describes the proposed action in detail. Alternatives considered, but eliminated from detailed study, are described at the end of this chapter.

ALTERNATIVES CONSIDERED IN DETAIL

The Proposed Action

Reclamation proposes to: (1) install a fish screen; (2) remove the existing headgate structure and construct a new headgate facility downstream of the fish screen; (3) construct a new trash rack structure upstream of the fish screen; (4) construct a new fish bypass bifurcation structure, pump, two fish bypass pipelines capable of sending fish and bypass flows to either Upper Klamath Lake or downstream of Link River Dam, and construct a fish evaluation station to monitor and evaluate fish that pass through the fish screen, and; (5) remove the existing water measuring flume and replace with new electronic flow measuring device.

1. Install New Fish Screen

The fish screen would be a vertical flat plate, single-vee shaped screen (Figure 4) located in the canal prism just downstream of the new trashrack structure. Similar screen designs are in use at several locations in Pacific Northwest. The vee screen is designed to screen water while maintaining a suitable transport velocity to move the fish to a bypass pipe which would transport them to the desired discharge location(s). The screen would meet the following criteria: (1) maximum mesh size of 3/32 inch (2.3 mm); (2) maximum approach velocity of 0.2 feet/second; (3) maximum sweeping flow of 0.4 feet/second; and maximum flow capacity of 1100 cfs. The vee screen would consist of 4 primary screen panels (2 on each side of the canal) approximately 11 feet wide by 10.5 feet high. The screens attach to piers. The vee portion of screen would transition into 26 parallel secondary screen panels (13 on each side), which then transitions into the bypass pipe. The screens would be equipped with automated cleaning mechanisms. The bottom of the screen structure is 0.5 feet below the bottom of the screen, allowing the screen cleaning system to operate without interference with the bottom of the canal.

Screen cleaning would be accomplished with a mechanical brush system. This system would consist of a brush cleaning mechanism mounted on a monorail track system. The carriage would travel parallel to the screen face supporting a brush assembly that would sweep the screen as it passed. The carriage would be supported on an I-beam attached to horizontal supports. The brush system would be driven by a cable system, powered by an electrical motor, with a variable speed drive, coupled to a gear reducer. The cleaning cycle could be initiated by any of the following: a high water level differential across the screens; an elapsed time period; or by manual actuation. One or two screen panels would be designed for “breakaway” capability in the event that large amounts of trash, debris or vegetative matter are deposited against the screen and threaten its structural integrity.

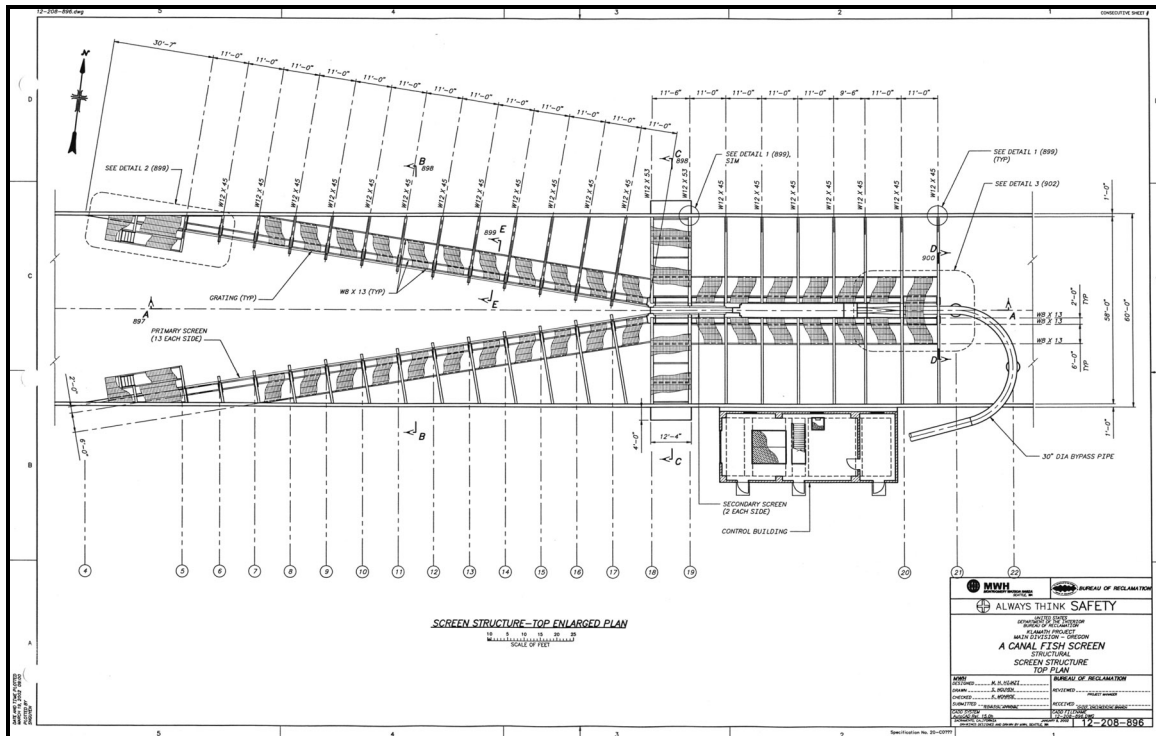


Figure 4: Screen Structure Top Plan.

Baffles would be installed behind the screens to balance and dampen the approach flow velocity through the screens. The baffles would be a steel plate, one-foot wide and as tall as the screens. They are oriented vertically in a steel frame where each baffle plate will rotate about a pivot point located at its center. By setting the angle of the individual plates, flow can be regulated through the screens. A pin can be inserted into a plate fixed at the top of the pivot to fix each panel at its desired angle.

Overhead rail cranes would be installed to remove screen panels, screen cleaners, or baffles. Both sides of the screen structure are accessible for locating a boom truck or crane. The fish screens could be dewatered for maintenance by installing bulkheads in the new trashrack structure and closing the gates in the new headworks.

The floor of the fish screen structure would ramp up at the apex of the screen vee. This ramp would accelerate flow as it approaches the control weir. The control weir would regulate the flow into the bypass pipe; and would consist of a movable, rectangular, flume section, attached to the top of a weir gate. The weir/flume gate would have a crest width of 1.5 feet, and would have a motor operator. The gate position would be electronically controlled to maintain a suitable transport velocity and a constant bypass flow. A fixed transition section downstream of the movable section is designed to provide a smooth transition from the flume to the bypass pipe. (Figure 5)

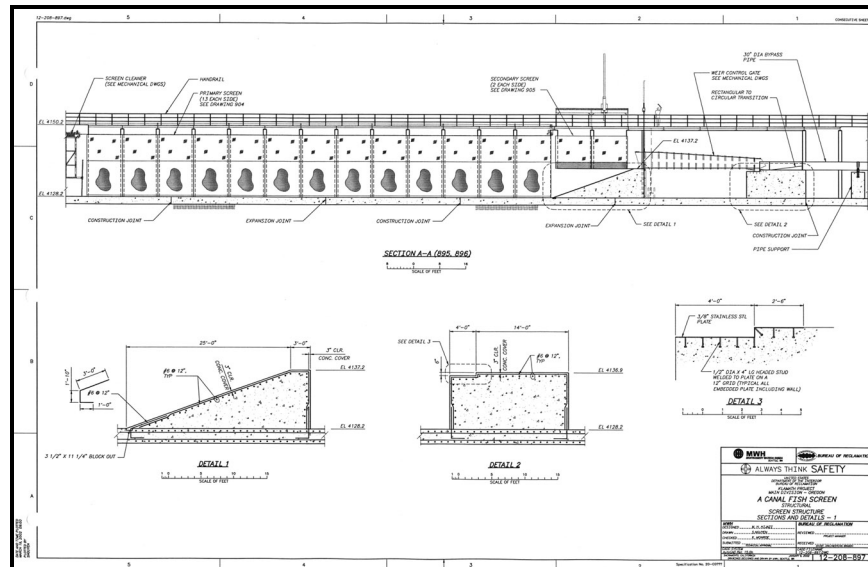


Figure 5: Screen Structure Section Details.

2. Remove Existing Headgate and Construct New Headgate

Reclamation proposes to remove the existing headgate structure and construct a new headgate downstream of the new fish screen. The existing headgate structure is 95 years old and in poor condition. The new fish screen requires an adequate water depth to maintain required approach velocities over the range of canal flows. The new headgate structure would be wider (typically 56-feet wide). It would be able to pass higher flows at lower lake levels than the existing structure because the existing ramp flume would be removed.

The new headgate structure would consist of six gates, each eight-feet wide, with electrical motor operators that would drive each gate independently, providing for more precise control of the flow (Figures 6, 7, & 8). The gates would be automatically controlled to deliver a preset flow to the canal. The same programmable logic controller (PLC) that operates and monitors the fish screen would be used to operate the head gates. Data from the new electronic flow measurement device would be integrated into the PLC, which could serve both the headgate and the fish screen.

The new headgate structure would have slots for steel bulkheads to be installed downstream from each of the six gates. This would allow single gates to be dewatered for maintenance or repairs.

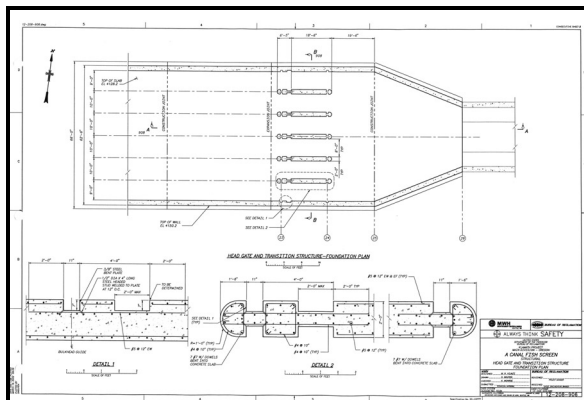


Figure 6: Headgate and Transition Structure Foundation Plan.

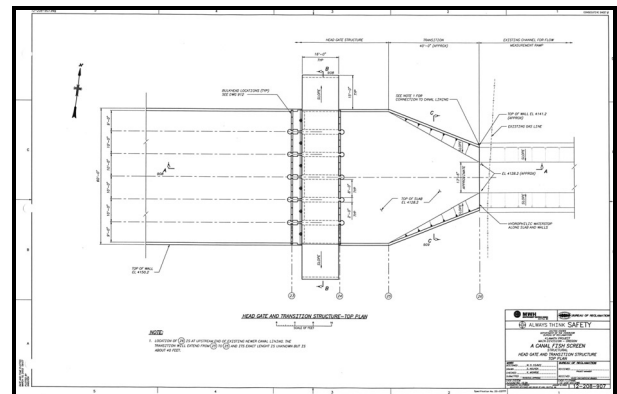


Figure 7: Headgate and Transition Structure Top Plan.

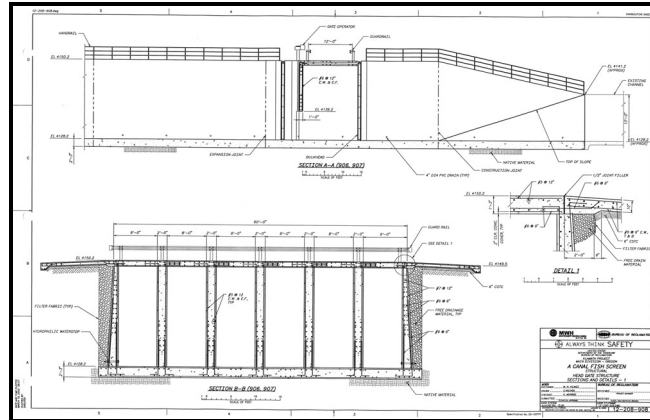


Figure 8: Headgate Structure Sections and Details-1.

3. Construct New Trash Rack Structure

A new trash rack structure would be constructed at approximately the same location as the existing headgates. This structure would be equipped with six trash racks, each approximately 8-foot wide by 25-feet high. The trash racks are sloped and extend to the top of the structure to facilitate cleaning by an automated cleaning system. The cleaning cycle could be initiated by any of the following: a high water level differential across the screens, an elapsed time period, or by manual actuation. Each trash rack would be constructed of steel bars with center-to-center spacing of two inches, with a clear opening of 1-5/8 inch between the bars. The structure would serve several functions such as screening adult fish, collecting trash and dewatering the fish screens. The trash racks are equipped with stoplog guides and steel bulkheads could be installed to allow dewatering of the canal between the trash rack structure and the new headworks. The log boom located upstream of the existing headworks would be replaced. (Figures 9, 10, & 11)

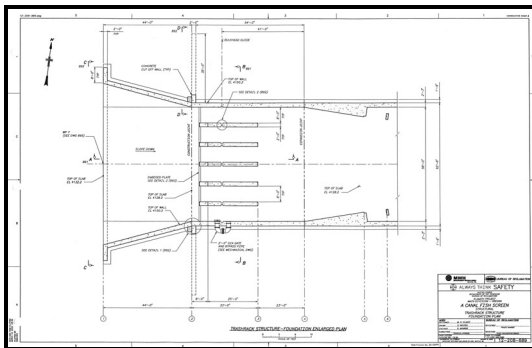


Figure 9: Trashrack Structure Foundation.

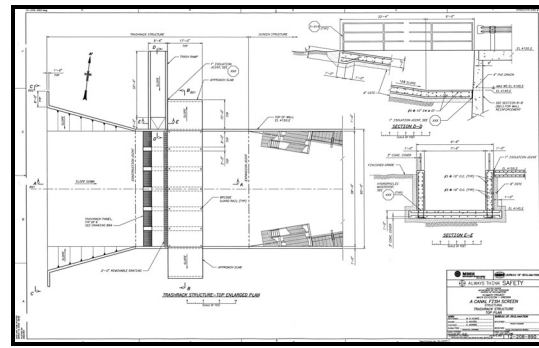


Figure 10: Trashrack Structure Top Plan.

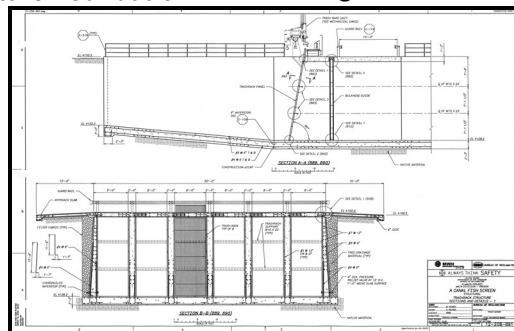


Figure 11: Trashrack Structure Sections and Details

4. Install Fish Bypass Pipelines and Appurtenant Facilities

Reclamation would construct a fish bypass bifurcation structure capable of sending fish and bypass flows to either Upper Klamath Lake or downstream from Link River Dam. It would be located adjacent to the A Canal fish screen and would include a pump to deliver fish and bypass flows back into Upper Klamath Lake.

From the bifurcation structure, Reclamation would install a primary, 24-inch diameter pressurized fish bypass pipeline extending to a fish evaluation station (FES) located near the shoreline of Upper Klamath Lake immediately south of the entrance channel to the A Canal (see figure 12). The FES would be an approximately 70 foot by 35 foot building. It would be used to evaluate the fish that pass through the fish screen and the pump system. This pipeline would then extend from the FES into Upper Klamath Lake.

The primary fish bypass pipeline would extend approximately 800 feet, and discharge near the opposite shoreline of UKL (see figure 12). The discharge point of this pipeline would be located a minimum of three feet below the minimum lake water surface elevation. Most of the pipeline would be laid on the lake bottom and held in place by concrete weights. A short portion of this pipeline (60-80 feet) extending from the east shoreline would need to be buried. Burying the pipe would be done using either a dragline or cofferdam method. If a dragline method were used to install the pipeline, removal of approximately 500 cubic yards (cy) of material would be required to install a short portion of this pipeline in a trench about 60-80 feet long, extending out from the east shoreline of UKL.

The cofferdam method would install the short portion of the primary pipeline using a small cofferdam in UKL (Figure 12). The equipment could move onto the cofferdam to bury the pipeline. After the pipeline installation is complete, the cofferdam would be removed. The cofferdam would be made of approximately 3,000 cy of clean gravel, and no backfill or removal of original material would be required. About 370 cy of material will be removed for the installation of the pipeline itself, and there will be about 350 cy of backfill.

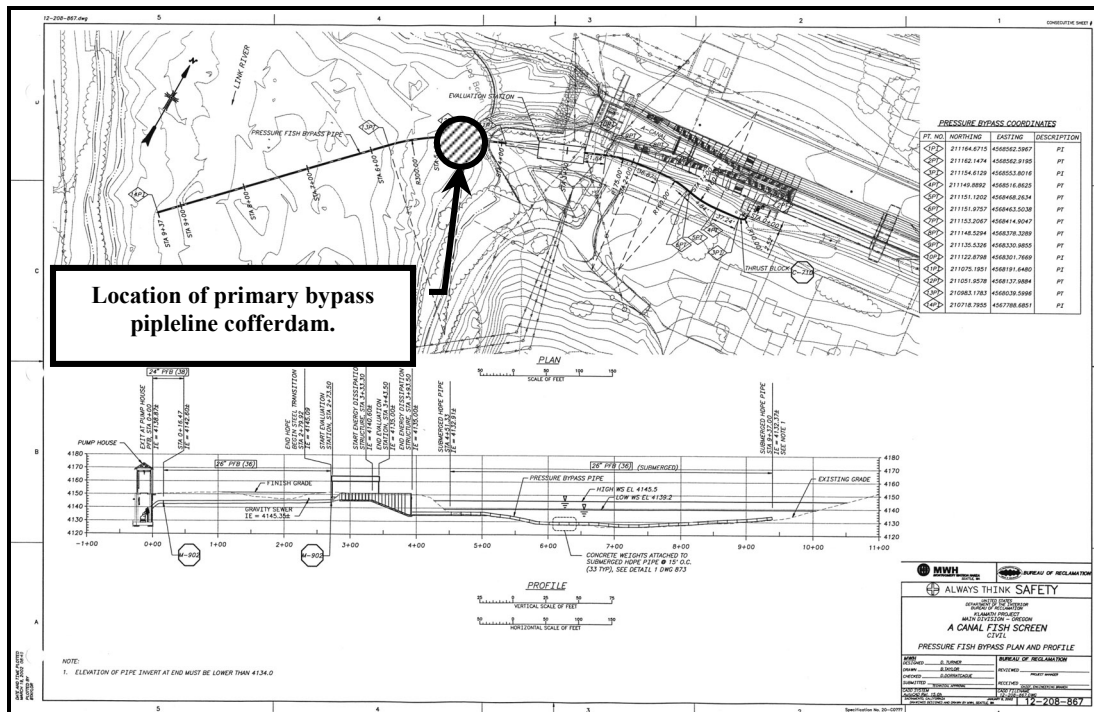


Figure 12: Pressure Fish Bypass Plan and Profile and pipeline cofferdam.

A secondary 36-inch diameter gravity flow pipeline would be installed from the bifurcation structure to a discharge point located at or downstream from Link River Dam (see Figure 13). Due to geologic considerations, several options for the alignment and specific configuration of this pipeline were considered at the time this EA was prepared. These options include:

Open trench - This option would involve excavating an open trench for substantially the entire length (approximately 3,300 feet). The trench would be 8 to 20 feet deep with the deepest portion downstream of Link River Dam. The top width of the trench would be up to 65 feet. Excavation in rock would be performed using blasting. Excavated material would be stockpiled for use as backfill or hauled offsite for disposal. The trench would require dewatering because of its depth and proximity to groundwater. A pipeline would be placed in the trench and buried. This pipeline would cross over PacifiCorp's penstock and then discharge into the Link River (see Figure 13). An outfall structure would be constructed where this option discharges into the river. About 4 acres of surface would be disturbed and approximately 8,000 cubic yards of material would be removed. The excavated pipe trench would be backfilled with about 4,000cy of imported structural backfill (gravel) and about 3,000 cubic yards backfill material removed at the original excavation.

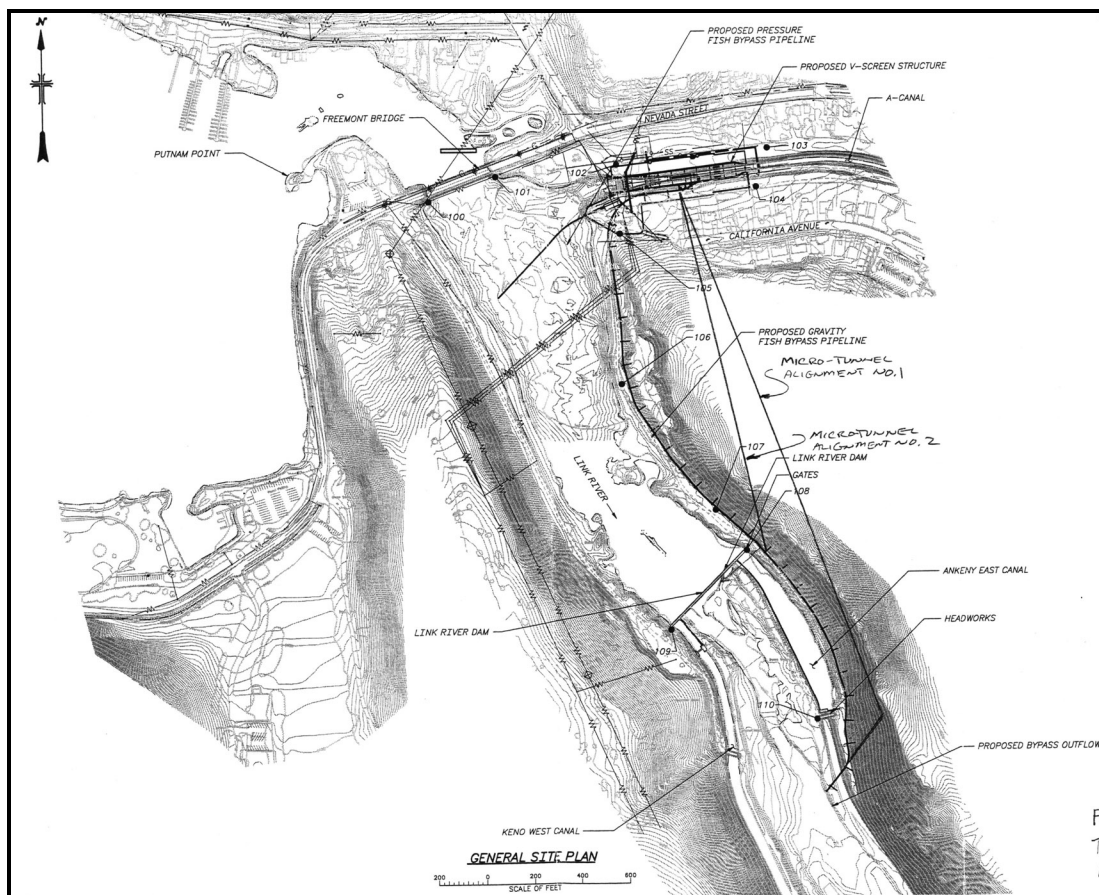


Figure 13: General Site Plan Including Secondary Bypass Options.

Micro-tunneling – This option would involve excavating a tunnel for the secondary bypass pipeline using micro-tunneling technology. The tunnel would be excavated using a remote controlled, laser guided micro-tunnel boring machine. This option likely involves approximately 3,000 feet of tunnel, combined with a short reach at the outlet point of

buried pipeline installed similar to that described for an open trench. Roughly 300 feet of pipeline will be buried, not tunneled. This would involve about 0.2 acre of surface disturbance and roughly 250 cubic yards of material removal. A pit would be dug at each end of the tunnel for a working and jacking area. These pits would be about 20 feet wide and 30 feet long each, about 14 feet deep, and involve about 350 cubic yard each of removed material that will be put back in the pit after completion. This will involve roughly less than .1 acre each, and the pit near the A Canal will be in a construction use zone, and the pit at the outfall of the tunnel will be on previously disturbed ground.

The tunnel under this option would emerge downstream of Link River Dam. The pipeline would then pass over the wooden penstock to an outfall location. An outfall structure would be constructed where this option discharges into the river. The tunnel would result in approximately 2,500 cubic yards of material removal, with no surface disturbance.

5. Flow Measurement

The existing measurement ramp flume would be demolished. It would be replaced with a lined prismatic channel section. A new electronic measuring device would be installed in the new canal channel. Output from this device would be integrated in the PLC for the new head gate operators.

Other Project-related Activities

Irrigation Deliveries

Irrigation deliveries through the A Canal would not be interrupted during construction of the fish screen and the new headworks. Construction-related activities within the canal would occur during periods when irrigation deliveries are not routinely made (generally October 15 to April 1). Construction and/or installation of appurtenant facilities associated with the fish screen, headgates or trash rack would occur during this period and would involve all appurtenances that require installation in the dry and infringe into the A Canal's water conveyance section.

Construction Activities

A cofferdam would be constructed immediately upstream of the existing headworks (see Figure 14). The cofferdam would be constructed of clean gravel, have a volume of about 1500 cubic yards (cy), and cover approximately 0.2 acre. No original material would be removed prior to construction of cofferdam. The top of the cofferdam would be at elevation 4146 feet, and the floor of the cofferdam will be at elevation 4136 feet.

The cofferdam would be removed prior to April 1 so irrigation deliveries can occur in the A Canal. No drawdown of Upper Klamath Lake would be required solely for installation of the cofferdam or for the project. Fish salvage would be conducted in portions of the A Canal that would be dewatered because of this project (i.e. downstream of existing headgates and the area between the cofferdam and existing headgates) before initiation of construction activities within the A Canal. The fish salvage would be performed by Reclamation.

Approximately 30,000 to 35,000 cubic yards of soils and material would be excavated/removed for the new portion of the A Canal where the fish screen would be installed and new headgates constructed. Excess excavated material would be disposed of in several locations: (1) on the existing A Canal right-of-way adjacent to the fish screen and new headworks down to the entrance of the A Canal Tunnel; (2) an upland site in an existing quarry located on PacificCorp-

owned land about 700 feet south of the A Canal; and/or (3) other alternative off-site locations yet to be determined such as, Reclamation lands adjacent to the Lost River Diversion Channel.

Contractor use areas for work yards, storage areas, equipment/vehicle parking, offices and other temporary construction-related activities would be located on either previously-disturbed areas or areas cleared for use for the project. The use areas would be adjacent to the project on PacifiCorp, City of Klamath Falls, or Reclamation-owned lands. Such use areas would occupy approximately 3-5 acres. A portion of the construction-disturbed area would be gravel surfaced around the fish evaluation station and other locations adjacent to the fish screen. Existing suitable soil would be stripped from excavated areas and stockpiled for later use during rehabilitation and reseeding of disturbed areas.

Access to the project site would be on existing roads. Such roads would be used by conventional and heavy equipment for transporting equipment, supplies, aggregate, excess excavated material and other activities related to the project. Water would be applied to unpaved road surfaces when needed for dust abatement, public safety or maintenance. Roads and/or streets damaged as a direct or indirect result of project-related traffic or activities would be repaired to the condition existing prior to the project.

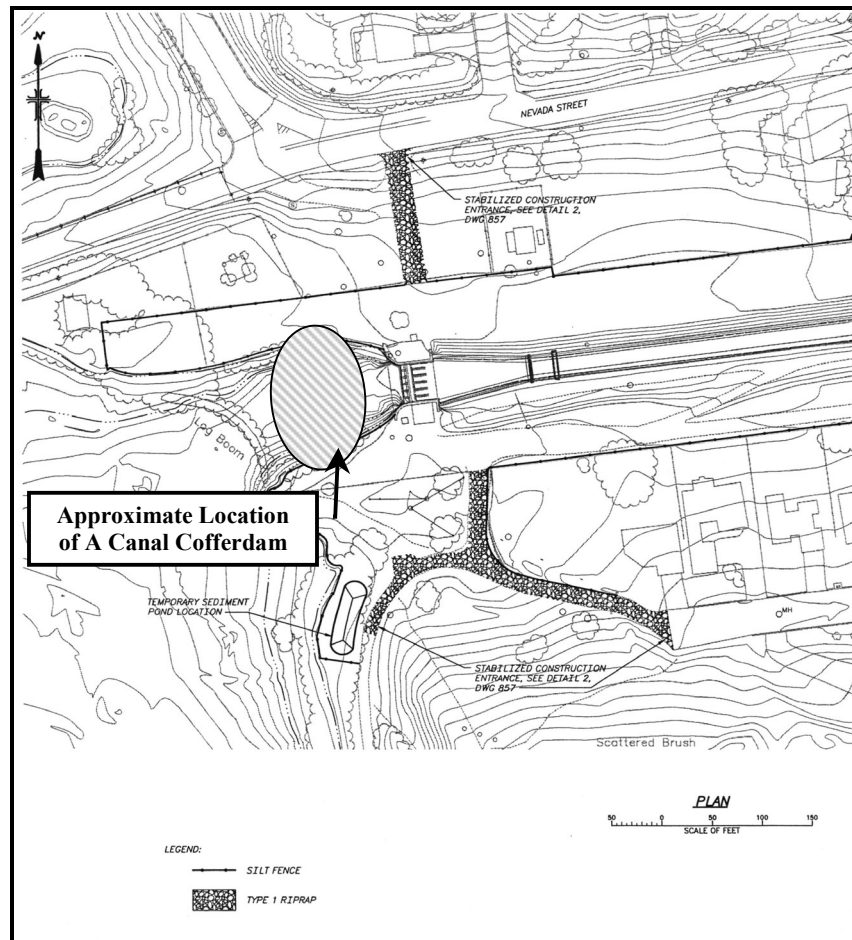


Figure 14: General Location of Cofferdam

Several existing utilities would be relocated. The project area would be closed to public access. Signs would be placed advising/warning the public of the project. No residential or commercial roads would be closed because of the project. No new roads would be constructed as a result of

the project. Reclamation would implement a public involvement plan, in coordination with the City of Klamath Falls, to develop and implement measures to avoid or reduce the adverse effects of construction-related activities on local residents directly or indirectly affected by the project.

Construction Schedule

The construction schedule for the project is planned to meet the commitment made by the Secretary of the Interior, Gale Norton, in early March 2002 that the screens will be completed by the beginning of the irrigation season on April 1, 2003. Consistent with that commitment, project construction would begin in August 2002. Construction activities occurring within and adjacent to the A Canal would occur concurrently, although in-canal activities would be timed to coincide with the cessation of irrigation deliveries in late September or early October 2002. The fish screen, new headgates, trash rack and primary fish bypass pipeline would be completed by April 1, 2003. The secondary fish bypass pipeline would be completed by the end of October 2003. The Oregon Department of Fish and Wildlife (ODFW) has a “preferred” period for doing work in Upper Klamath Lake from July 1 through January 31. ODFW has indicated that the proposed construction schedule would be consistent with the preferred period. This schedule would require work during the winter and would require special measures and construction methods. It may also require extended daily work periods, up to and including 24-hours per day, to complete the work between August 2002 and April 2003.

Operation and Maintenance

The fish screen and new headgates would be operated during the irrigation season (normally from about April 1 to October 15 annually) or whenever water is being delivered to the A Canal. The water district would operate the fish screen facility. District and/or Reclamation employees would periodically visit the facility to assure proper, safe and continuing operation. There would be daily vehicle traffic to the facility and parking would be provided for several (4-6) vehicles. There would be two bridges over the A Canal (at the trash rack and at the new headgate) to allow vehicle access to both sides of the canal. The fish evaluation station would be in operation during certain periods to monitor the performance and effectiveness of the screens. Automated screen cleaning would occur and periodic collection and disposal of accumulated debris and vegetation would be performed. Such material would be disposed of at appropriate locations. There would be exterior lighting of the facility. During the non-operation period (generally October 15-March 31 annually) there could be maintenance, repair or replacement of necessary equipment or facilities. Bulkheads can be installed in the trash rack and new headgates to allow dewatering of the fish screen for repairs or maintenance.

MITIGATION MEASURES INCORPORATED INTO THE PROPOSED ACTION

The following mitigation measures are incorporated into the proposed action to mitigate adverse effects of the project:

1. Management practices will be employed during construction activities to minimize environmental effects and will be implemented by Reclamation construction forces or included in construction specifications. Those practices or specifications include sections on public safety, dust abatement, air pollution, noise abatement, water pollution abatement, waste material disposal, erosion control, archaeological and historical resources, vegetation and wildlife.
2. Additional environmental analyses and compliance may be necessary if the proposed action changes significantly from that described in the EA because of additional or new information. For example, if the estimate of spoil material increases or if different spoil, borrow or work areas

are required, environmental as well as cost considerations will be included in determining the final location of these areas.

3. Construction of the project would require a Clean Water Act-Section 404 Permit, Section 401 state water quality certification and a State of Oregon removal/fill permit for discharges of dredged or fill material into the waters of the United States. Such activities associated with this project could include the cofferdam, outfall structures/pipelines for the primary and secondary fish bypass pipelines disposal sites for excavated material or construction material sources. The necessary permits and authorizations would be acquired by Reclamation prior to initiation of construction activities. The conditions and requirements of these permits will be strictly adhered to by Reclamation. Reclamation would fully mitigate any loss of jurisdictional wetland with appropriate in-basin, in-kind mitigation as determined in consultation with the U.S. Army Corps of Engineers and the State of Oregon, and required as a condition of a 404/fill-removal permit. Reclamation will implement adequate wetland mitigation to fully compensate for any impacts to the waters of the United States.

4. A Clean Water Act-Section 402 National Pollutant Discharge Elimination System (NPDES) permit would be required and obtained from the State of Oregon prior to any discharges of water resulting from activities associated with the project and appurtenant facilities, if such water is to be discharged as a point source into Upper Klamath Lake or the Link River. A NPDES permit would also be required and secured for stormwater discharges associated with project construction activities.

5. In the event that any cultural and/or paleontological site (historic or prehistoric) is discovered, it shall be immediately reported to the Area Manager of the Klamath Basin Area Office. An evaluation of the significance of the discovery will be made by the archaeologist to determine appropriate actions to be taken to prevent loss of significant cultural or scientific value and; (2) Any person who knows, or has reason to know, that they have inadvertently discovered human remains on Federal or Tribal lands must provide immediate telephone notification of the inadvertent discovery to the Area Manager at (541)883-6935. Work will stop until archaeologists are able to assess the situation onsite. Follow-up actions will comply with the Native American Graves Protection and Repatriation Act (P.L.101-60) of November 1990.

6. Documentation efforts will be performed at the existing A Canal Headworks to mitigate adverse effects to this National Register-listed Property. A Memorandum of Agreement will be completed between SHPO and Reclamation to guide this effort.

7. All construction activities and appurtenant work (such as borrow sources, waste areas, staging and storage areas, and vehicle and equipment parking areas) will be on previously-disturbed areas, to the extent practicable.

8. Existing roads will be used for project activities.

9. There will be no interruption of irrigation deliveries through the A Canal or change in operation of Upper Klamath Lake to implement the project.

10. Construction sites will be closed to public access. Signs or temporary fencing may be installed to prevent public access. Reclamation will coordinate with landowners, homeowners, local residents and the City of Klamath Falls regarding access to, or through the project area.

11. All disturbed areas resulting from the project shall be smoothed, shaped, recontoured and rehabilitated to as near their pre-project construction condition, as practicable. Disturbed areas

shall be reseeded with appropriate native seed mixes and at times suitable for successful revegetation after completion of construction and restoration activities. The composition of seed mixes shall be coordinated with the U.S. Fish and Wildlife Service and Oregon Department of Fish and Wildlife.

12. An Environmental Commitment Plan (ECP) and Checklist (ECC) will be prepared and used by the Klamath Basin Area Office to ensure compliance with the environmental commitments and the environmental quality protection requirements. A post-construction environmental summary (PCES) shall be prepared within one year after completion of the project to assess the effectiveness of the mitigation measures.

13. Permits required pursuant to compliance with federal, state, local and tribal environmental protection laws and regulation shall be acquired before initiation of ground-disturbing activities. Conditions of such permits shall be fully complied with by Reclamation and/or its designated representative.

14. Reclamation would implement a public involvement plan, in coordination with the City of Klamath Falls, to develop and implement measures to avoid or reduce the adverse effects of construction-related activities on local residents directly or indirectly affected by the project.

15. The daily work schedule and allowable noise levels for Project-related construction activities will be coordinated with the City of Klamath Falls and local residents to minimize effects. Reclamation will implement measures (such as timing of certain construction activities, limitations on types of construction activities, and public notification) determined to be necessary. Noise levels will be monitored outdoors from areas considered noise-sensitive, such as residential areas.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER STUDY

Reclamation briefly considered the following alternatives. The alternatives are briefly described along with the reason(s) they were eliminated from further study.

Passive screen – This alternative involved installation of a passive vertical flat plate screen upstream of the intake channel for the A Canal. The screen would be approximately 550 feet long. This alternative was eliminated from further study because it could not be completed in time to meet the prescribed time deadline set by the U.S. Fish and Wildlife Service for A Canal entrainment reduction.

Screens with alternative discharge points for fish bypass pipelines – Reclamation considered several fish screen designs that included fish bypass pipeline(s) that discharged only into the Link River downstream from Link River Dam. These alternatives were eliminated because of concerns regarding the existing poor water quality and lack of aquatic habitat for fish that would be discharged into the Link River and Lake Ewauna.

Modular, horizontal flat plate, floatable fish screen – This alternative involved installation of floatable fish screen structures upstream from the existing headgates. The floatable fish screens would be horizontally oriented and connected via large pipes to the existing headgates. The screens would be periodically cleaned using discharges of compressed air through the screens. This alternative was eliminated because it involved an unproven technology, maintenance and concerns about its cost.

Single-vee fish screen with fish bypass pipeline discharge at Putnam Point - This alternative was similar to the proposed action but included a fish bypass pipeline that would discharge at or near Putnam Point. This may reduce the possibility of re-entrainment of fish if they are discharged into Upper Klamath Lake near the intake channel for the A Canal. This alternative was eliminated because of the potential disturbance to Putnam Point Park which would likely result in construction delays. This alternative could not be completed within the prescribed construction schedule.

Trap-and-haul – This alternative would involve installation of a system of screen/nets in Upper Klamath Lake upstream of the inlet to the A Canal. The screens/traps would capture endangered and other fishes in the southern part of Upper Klamath Lake and then transporting the fish to other locations in the lake. This alternative was eliminated because it would be excessively labor and equipment intensive, with an unproven ability to satisfy the purpose of and need for the project.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

INTRODUCTION

This chapter describes the environment or resources affected by the proposed action and alternatives and the predicted effects of the proposed actions and alternatives. The discussion is organized in the same order of the resource issues described in Chapter 1.

The affected environment (or present condition or characteristics of the resource) is discussed first under each resource issue. This is followed by a description of the predicted effects of the proposed action alternative. Direct, indirect and cumulative effects have been considered. The environmental effects are summarized in Table 2 at the end of the chapter.

CULTURAL RESOURCES

Description of the Affected Area

The region, although remote and isolated, was visited by fur trappers and government explorers in the early to mid-nineteenth century. Within a few short years, overland emigrants began to move into the Klamath River region along newly developed wagon roads and trails. Occupation of the Klamath Basin was encouraged by a series of Federal incentives to provide land to settlers. The Preemptive Act, 1862 Homestead Act, and the Swamp Land Act all sparked interest in the basin and elsewhere in the West. However, settlement remained sparse until after conclusion of the Modoc War in 1873. Ranching, logging and farming became the main economic pursuits in the Klamath Basin, although settlements were far apart and business was slow to develop. (Clear Lake 2000)

Early farmers recognized that the region's agricultural potential was limited by low precipitation. Several early irrigation canals were completed to provide reliable water. Several canals operated, either draining lower Klamath Lake or working a saw and flour mill at Link River near Klamath Falls. Other ditches were constructed on Lost River and Lower Klamath Lake and two more off Link River. Ultimately, rights to all existing canals were acquired by the Federal government. Investigations by the Federal Reclamation Service were initiated in 1903 and construction on the Klamath Project began in 1906. (Clear Lake 2000)

The Link River canyon and the river itself falls between traditional Klamath and Modoc Indian territory. Settlements from both groups are placed in the general region. Spier (1930) places a village on both margins of the lake at the entrance of Link River. Spindor (1993) identifies the Klamath village of *Yulalona* in the same general area, near the present day Fremont Bridge, although. Evidence of this site has been obscured by recent development.

The Klamath and Modoc spoke dialects of a single language, a member of the Plateau Penutian language family. They pursued a mixed diet of plants, fish, water fowl, game. Fishing played a major role in the aboriginal diet with emphasis upon the seasonal salmon, sucker, and trout runs. The Link River served as a corridor between Upper Klamath Lake and Lake Euwana.

The A Canal (formerly the Main Canal) was the first irrigation facility completed on the Klamath Project. Completed in 1907, this nine mile long canal delivers the majority of irrigation water from UKL to the Klamath Project. For more detailed information, refer to the Location and General Description of A Canal Headworks section in Chapter 1 – Need for the Proposal of this document. (Project 2000)

The A Canal has previously been determined eligible for inclusion in the National Register of Historic Places (National Register) under criterion “a” (Willingham 2001). The A Canal headworks, as an integral part of the A Canal, is also considered eligible for inclusion in the National Register. Reclamation believes that Link River Dam is also eligible under criterion a. (Welch 2001)

National Historic Preservation Act (NHPA)

The A Canal headworks are likely considered eligible for inclusion in the National Register of Historic Places because it is the first structure built by Reclamation for the Klamath Project and perhaps the first in the State of Oregon. The headworks are the primary facility for delivery of water to the Project from Upper Klamath Lake. Reclamation would enter into a Memorandum of Agreement (MOA) with the Oregon SHPO and the Advisory Council on Historic Preservation and mitigation measures would be implemented prior to modification of the headworks.

Environmental Effects

Reclamation believes that the undertaking planned for the A Canal Headworks will result in an adverse effect, by the demolishing of the existing headworks. However, undertakings proposed for the A Canal and Link River Dam will result in no significant adverse effect due to the minor nature of the activities, and additions to the dam. (Welch 2001) A two-party MOA between Reclamation and the Oregon SHPO will be prepared and implemented prior to modification of the A canal Headworks.

On November 12, 2001, Patrick Welch, Bureau of Reclamation, Mid-Pacific Regional Office, conducted a field survey of the project area, and found no archeological resources at the site. Another sight survey was conducted on February 26 and 27, 2002. During this survey, trenching was used to determine any archeological resources in the project area, including the paths of the proposed bypass pipelines. Patrick Welch and Jim Welch for the Mid-Pacific Regional Office were in attendance, as well as Gerald Skelton from the Klamath Tribes. Many other individuals working with the project, including engineers, contractors, and environmental staff, were also present to observe trenching activities. No archeological resources were located during the fieldwork. (Cultural 2002)

Suggested Mitigation

Mitigation is incorporated into the proposed action described in Chapter 2 – Proposed Action and Alternatives.

THREATENED AND ENDANGERED SPECIES

Description of Affected Environment

Two federally listed endangered fish, the Lost River and shortnose suckers inhabit UKL, Link River, and the A Canal. The shortnose sucker (*Chasmistes brevirostris*) and the Lost River sucker (*Deltistes luxatus*) are native and exclusive to the Upper Klamath River basin (Figures 15 and 16). They historically were abundant, but are now uncommon. Both species were listed as

endangered under the Endangered Species Act in 1988. UKL, Tule Lake, Gerber Reservoir, Clear Lake and the Klamath River reservoirs (Keno, J.C. Boyle, Copco, and Iron Gate) are habitats for the endangered Lost River and shortnose suckers. These sucker species colonized the Klamath River reservoirs as they were constructed. Both endangered sucker species are predominantly lake dwelling, and therefore depend heavily upon satisfactory lake water quality and habitat conditions for long-term population viability. The suggested reasons for their endangered status includes the damming of rivers, dredging and draining of marshes, water diversions, hybridization, competition and predation by exotic species, insularization of habitat, and water quality problems associated with timber harvest, removal of riparian vegetation, livestock grazing, and agricultural practices. (Reclamation 1994)

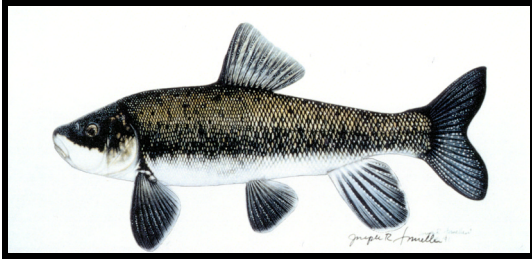


Figure 15: Endangered Shortnose Sucker

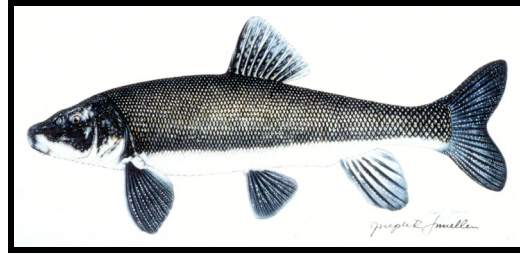


Figure 16: Endangered Lost River Sucker

Additionally, the Threatened Bald Eagle forages in the area near the A Canal and Link River Dam. They also perch on the power poles that pass along the ridge west of the Link River and also perch on trees in Moore Park. (Buettner 2002)

The Threatened Bald Eagle forages in the area near the A Canal and Link River Dam. They also perch on the power poles that pass along the ridge west of the Link River and also perch on trees in Moore Park. (Buettner 2002)

Refer to Appendix 1, *Biological Assessment for the A Canal Fish Screen Project* for more detail regarding Threatened and Endangered Species.

Environmental Effects

Water turbidity in the immediate area would be temporarily increased during construction activities. Any construction performed in the lake or river would be minor and temporary. All construction in the A Canal will occur after dewatering and salvage activities. The purpose of this project is to prevent suckers from becoming entrained into the A Canal. Dewatering activities could result in entrainment of suckers in the A Canal.

Construction may cause Bald Eagles to abandon foraging in the project area during construction. (Buettner 2002)

Contaminants such as gasoline or diesel fuel, oil, grease, concrete and sediment could be accidentally released into UKL, the A Canal, and/or, the Link River as a result of construction-related activities (such as equipment operation, vehicle fueling and servicing, fuel storage, sediment generated by construction) in the proximity of these water bodies. Accidental spills of these substances could occur that may find their way into the lake, canal, or river. Refer to Appendix 1, *Biological Assessment for the A Canal Fish Screen Project* for more detail regarding effects on Threatened and Endangered Species.

Suggested Mitigation

Mitigation is incorporated into the proposed action described in Chapter 2 – Proposed Action and Alternatives.

WETLAND AND RIPARIAN AREAS**Description of Affected Environment**

The wetland and riparian areas along the Link River consists of numerous species of grasses, sedges, and brushes that commonly occur in riparian zones. Willows, nettles, rabbit brush, giant wild rye, elderberry bushes, currant, and chokecherry bushes are examples of the plants found within the wetland and riparian areas of the Link River valley. There are also a variety of wildflowers and other trees in the area, such as, buttercup flowers, Queen Anne's lace flowers, western juniper trees, and poplar trees. There are even a few plum, apple, and pear trees along with some raspberry and blackberry bushes that were left from some early home site orchards.

Environmental Effects

Removal of a small amount of vegetation would be required. Minimal impacts on natural vegetation will occur. No special-status plant species will be impacted. The estimated wetland and riparian area impacted will be cumulatively less than one acre. A wetland delineation has been produced for the entire construction area prior to any construction to determine the amount a wetland and riparian vegetation disturbed by the proposed action. This report will also include suggested mitigation for any lost wetland or riparian areas.

Impacts on wildlife habitat are directly related to the removal of vegetation. In general, any disturbance of previously undeveloped areas in the riparian zone adversely affects wildlife by directly removing habitat. In addition, construction noise and activities and human intrusion after development can cause some animals to avoid otherwise suitable habitat. Removal of a small amount of vegetation would be required and minimal impacts on natural vegetation will occur. No long-term wildlife impacts would be expected as a result of development.

Suggested Mitigation

Mitigation is incorporated into the proposed action described in Chapter 2 – Proposed Action and Alternatives.

RECREATIONAL USES (Nature Trail)**Description of Affected Environment**

This section addresses recreational uses, visitor services and facilities, and the visitor experience. The Link River Nature Trail is located along the west bank of the Link River and the portion of UKL from Fremont Bridge to Link River Dam. Constructed by Pacific Power and Light Company, this scenic trail starts at the Fremont Bridge and runs 1½ mile down to the Favell Museum of Western Art and Indian Artifacts. The trail is affiliated with the USA National Trails System and is part of the Link River Bird Sanctuary and Small Game Refuge. At the north end of the trail is a quarter-mile paved path with two observation pads overlooking the A Canal Headworks. (Pacific Power 2002)

Visitors often walk or jog the mile stretch to view the wildlife and the Link River Dam. There are also several places to fish along the one-mile stretch. Boaters using small motor or rowboats infrequently use the stretch of UKL from the Fremont Bridge to Link River Dam. All of the above described facilities are located on the opposite bank from where construction activities will be conducted.

The east side of the Link River is not open to public access, and this is the side of the river that most, if not all, construction activities will take place. There is a private maintenance road located on the east bank that leads to PacifiCorp's power facilities. PacifiCorp's penstock and Ankeny Ditch are located on the east side of the river, and the Keno Canal intake is located on the west side of the river, near the nature trail. A portion of the secondary fish bypass pipeline will be located in the same area that the penstock and Ankeny Ditch begin.

Environmental Effects

All effects to these resources would be indirect. The proposed action would temporarily increase noise levels in the project area. Construction of the new headgates and the fish bypass pipeline from the headgates to the Link River Dam would be seen from the trail. The section of the fish bypass pipeline being installed below the Link River Dam would be seen from the trail. The described recreational activities would be interrupted only very temporarily during construction when installing the primary bypass pipeline. The Link River Nature Trail would bear minimal impact from the proposed action and the visitor experience would be disrupted only temporarily, and any disruptions would be minimal. Figure 17 is a view of the A Canal Headworks from the north end of the Link River Nature Trail. The trail would not have any direct impacts.

Suggested Mitigation

Mitigation is incorporated into the proposed action described in Chapter 2 – Proposed Action and Alternatives.

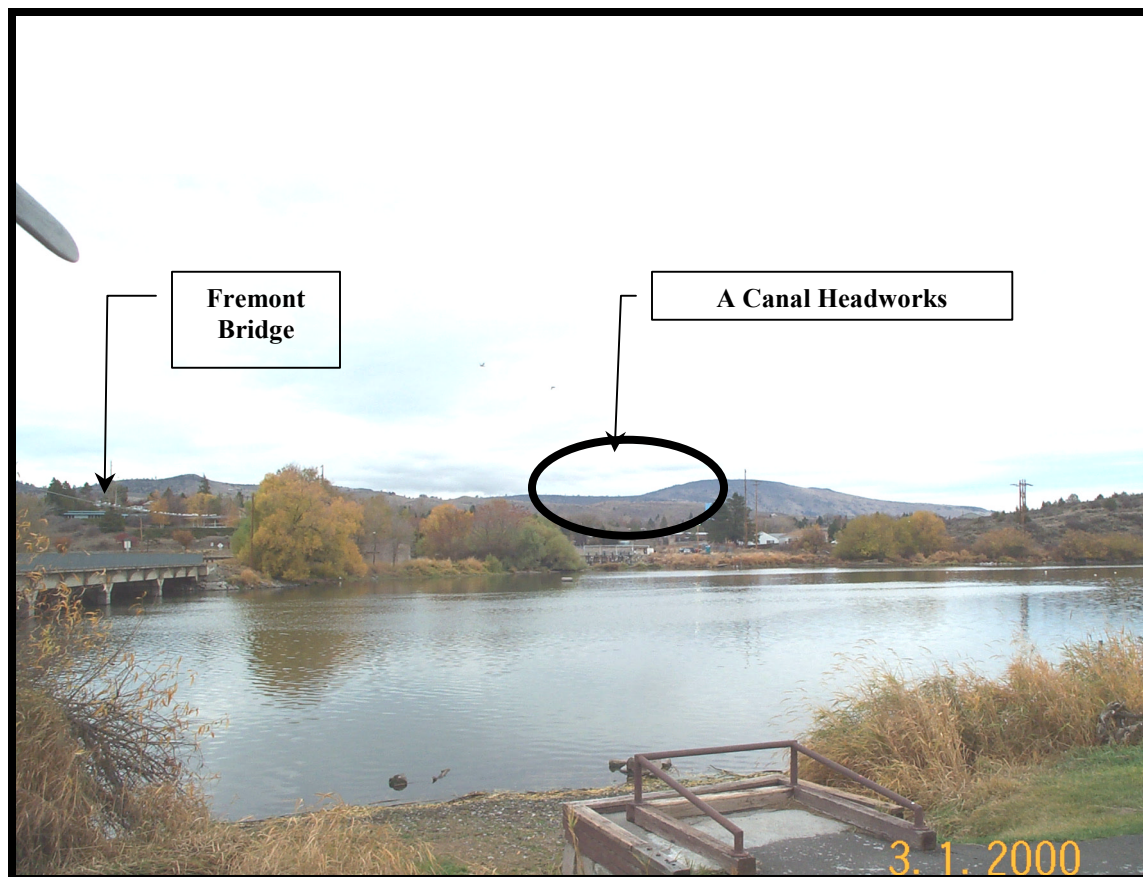


Figure 17: View of A Canal Headworks from the North end of the Link River Nature Trail. To the left of the photo is Fremont Bridge.

IRRIGATION USE

Description of Affected Environment

The A Canal provides irrigation water, either directly or indirectly through return flows, to the majority of the Project. Therefore, it is vital that construction is conducted in a manner that will not impair the delivery of water to irrigators in the Basin.

There are approximately 240,000 acres of irrigable lands and national wildlife refuge lands within the Project. Project water is provided to about 200,000 acres of these lands. This water feeds alfalfa, irrigated pasture, small grains, potatoes, onions, sugar beets, and miscellaneous other crops that are produced within the Project. Net use on the Project for an average year is approximately 2.0 acre-feet per acre, including the water used by the U.S. Fish and Wildlife Service (Service) in the Tule Lake and Lower Klamath National Wildlife Refuges. (Project 2000) Normal irrigation activities (i.e. diversions into the A Canal) in the Project begin in April and run through the summer months until October when all diversions to the Project from Upper Klamath Lake cease.

Environmental Effects

The installation of the fish screen, and construction of the new headworks facility would not impair irrigation activities in the A Canal. The fish bypass pipelines would not impair any normal irrigation activities. Due to the estimated time of installation of the fish screen and construction of the headworks (October through April), there will be no effects on Project irrigation activities. The new headworks would be operational for the following irrigation season. The installation of the secondary bypass pipeline will occur throughout the irrigation season but will have no effect on irrigation activities.

Suggested Mitigation

Mitigation is incorporated into the proposed action described in Chapter 2 – Proposed Action and Alternatives.

CONSTRUCTION-RELATED EFFECTS

NOISE

Description of Affected Environment

The proposed project would occur adjacent to residential areas within the city limits of Klamath Falls, Oregon. The closest residences are approximately 300 feet to the west and south of the existing headworks facility. Most of the existing residences are single family dwellings. There are numerous low speed residential roads and a single high traffic route adjacent to the project. The primary noise sources audible at or near the project area at present are: (1) passenger vehicles and commercial traffic on Nevada Avenue-Lakeshore Drive; (2) passenger vehicles on California Avenue; (3) occasional motorized boats on Upper Klamath Lake upstream from bridge; (4) released water from Link River Dam located about 1700 feet downstream from the existing headworks. Recreationists who value the present relative tranquility and solitude of the Link River corridor use the nature trail on the west side of the Link River.

Environmental Effects

Construction activities would be conducted within 300 feet of residential housing. Local residents will hear the sounds of construction activities and equipment, vehicles (esp. back-up alarms), excavation and other mechanical sounds inconsistent with normal background noise. Noise resulting from the proposed project would be louder and more continuous than existing noise sources and levels -- project-related noise would tend to be intense during certain time

periods of any single day. The most intense construction activities are expected to last between October 2002 and April 2003.

Suggested Mitigation

Mitigation is incorporated into the proposed action described in Chapter 2 – Proposed Action and Alternatives.

VISUAL

Description of Affected Environment

The proposed project would occur in an area that has been highly modified by human activities during the past 100 years. Water, canals, mechanical structures, roads, building, bridges, clearings and other visible evidences of use and occupancy characterize the immediately visible foreground and middle ground. There is a corridor of vegetation and natural-appearing topography adjacent to the Link River west and south of the project area. This area is adjacent to, and visible from, the nature trail on the west side of the Link River. The existing A Canal and headworks are visible but are not visually obtrusive to most viewers.

Environmental Effects

The proposed project would result in construction equipment and activities being visible to viewers during actual construction. Heavy equipment and vehicles, berms, soil stockpiles, and stored supplies would be visible. Cranes and other lifting equipment would be visible during construction, but duration of their visibility would be short. Additional permanent structures would be constructed that would be visible, but such structures would be consistent with the type and configuration of buildings already existing and visible in the project area.

Suggested Mitigation

Mitigation is incorporated into the proposed action described in Chapter 2 – Proposed Action and Alternatives.

Additional Construction Related Effects

- ◆ Topography, Geology, and Soils - Construction activities would result in surface disturbance of soils and soil compaction on the site.
- ◆ Air Quality – No effects on air quality would occur.
- ◆ Traffic – Temporary increase in traffic flow during construction period.
- ◆ Public Safety – Public access is restricted in the areas of construction, therefore no effects would occur.

Suggested Mitigation

Mitigation is incorporated into the proposed action described in Chapter 2 – Proposed Action and Alternatives.

OTHER RESOURCES AND ISSUES

Indian Trust Assets (ITA's)

Indian trust assets are defined as legal interests in property held in trust by the United States for Indian tribes or individuals, or property that the United States is otherwise charged by law to protect. The United States has a trust responsibility to protect and maintain rights reserved by or granted to American Indians or Indian individuals by treaties, statutes and executive orders. These rights are sometimes further interpreted through court decisions and regulations. This trust responsibility requires that all federal agencies take all actions reasonably necessary to protect

this trust. Reclamation policy states that it will carry out its activities in a manner which protects these assets and avoids adverse impacts when possible. When impacts cannot be avoided, Reclamation will provide appropriate mitigation or compensation. Assets can be real property, physical assets, or intangible property rights. Examples of trust assets are lands, minerals, hunting and fishing rights, and water rights.

The United States entered into a treaty with the Klamath and Modoc Tribes and the Yahooskin Band of the Snake Indians (Klamath Tribes) in 1864. This treaty reserved to the Klamath Tribes fishing, hunting and gathering rights on lands that were formerly part of the original Klamath Indian Reservation in Oregon (Nawi 1995:4). The treaty also provided for A water rights in off-reservation areas to the extent necessary to support a tribal fishery within the original reservation (Nawi 1995:5).

The Proposed Action Alternative would result in no adverse impact on Indian trust assets. No mitigation for adverse impacts would be needed. Reclamation will continue its consultation with the Bureau of Indian Affairs and Klamath Tribes regarding potential impacts on trust assets. The Proposed Action Alternative will result in a net benefit to the fish species held important by the Klamath Tribes. This action will eliminate the entrainment of fish in the A canal. There may be some loss of fish during the process to return them to UKL, but this will be negligible compared to the current conditions.

Environmental Justice

Executive Order 12898 established environmental justice as a federal agency priority to ensure that minority and low-income groups are not disproportionately affected by federal actions. The majority of residents in the project area are English-speaking but there is a Native American population located with the Klamath Basin area. The proposed project does not involve major facility construction, population relocation, health hazards, hazardous waste, property takings or substantial economic impacts.

The proposed project would not have an adverse human health or environmental effect on minority and low-income populations as defined by environmental justice policies and directives. The **Proposed Action Alternative** would not disproportionately affect any low-income or minority communities.

SUMMARY OF ENVIRONMENTAL EFFECTS

The environmental effects of the proposed alternative are summarized in Table 2.

**Table 2 - Summary of Environmental Effects
A Canal Fish Screen Project**

Resource/Issue	Predicted Effects
Cultural resources	The project would have an adverse effect on the existing A Canal and headworks. Installation of the fish screen and fish bypass pipelines would not have an adverse effect on cultural resources.
Threatened and Endangered Species	Construction-related activities may temporarily affect endangered Lost River and shortnose suckers. Operation of the fish screen would have a long-term beneficial effect on the endangered suckers. There would be short-term displacement of foraging/roosting bald eagles away from the project site during construction activities.
Wetland and Riparian Areas	Less than one acre of wetland/riparian area would be temporarily affected; mitigation would be implemented to avoid any net loss of wetlands.
Recreation Use	Recreation use in the vicinity of the project site would not be affected; may be temporary closures or restrictions on the Link River Nature Trail during placement of the primary fish bypass pipeline.
Irrigation	Irrigation deliveries would not be affected or interrupted by the project.
Construction-related Activities:	
<ul style="list-style-type: none"> Construction-disturbed areas 	Up to 10 acres (almost all previously disturbed during original construction of A Canal and/or Link River Dam. Limited sections of the secondary fish bypass pipeline may require blasting if buried pipeline option is selected.
<ul style="list-style-type: none"> Contractor use /work areas 	2-3 acres located on existing disturbed areas on Reclamation-owned property.
<ul style="list-style-type: none"> Duration of construction 	Begin in mid-August 2002; in-canal activities begin when irrigation deliveries cease (est. Oct. 1, 2002); daily work schedule may be up to 24 hrs/day during certain periods; construction of the fish screen, trashrack, log boom, headworks, and primary bypass pipeline would be completed by April 2003; construction of secondary bypass pipeline would be completed by Oct. 31, 2003.
<ul style="list-style-type: none"> Disposal sites for excavated material 	Excess excavated material (est. 30,000-35,000 cy) placed: 1) onsite on Reclamation-owned lands along A Canal; 2) onsite in existing quarry on PacifiCorp-owned lands; 3) hauled to other off-site locations, if needed, such as Reclamation lands adjacent to Lost River Diversion Channel.
<ul style="list-style-type: none"> Construction access and traffic 	Access to project site on existing roads; daily traffic would include contractor and its employees, heavy trucks and trailers for hauling equipment, supplies and excavated material. Ave. daily traffic est. to vary from 25-200 vehicles.
<ul style="list-style-type: none"> Cofferdam 	Temporary embankment structure constructed upstream from existing headgates; up to 1500 cy fill and 0.2 acre; totally removed by April 1, 2003. Temporary structure extending into UKL, along primary bypass pipeline; up to 3,000 cy of fill and <1acre; removed by April 1, 2003.
<ul style="list-style-type: none"> Utility relocations 	2 sewer lines (1 active, 1 abandoned); 1 gas pipeline; 1 power line (or poles/guy lines only)
<ul style="list-style-type: none"> Noise 	Generally intermittent noise commonly related to operation of heavy equipment and motorized vehicles; may be continuous for short daily periods and during varying times (i.e early morning or late night); noise levels would be monitored from affected locations.

CHAPTER 4 – CONSULTATION AND COORDINATION

PUBLIC INVOLVEMENT

On January 4, 2002, the Scoping Notice describing the proposed action alternative was sent out to forty-six different agencies, organizations, and individuals. Two comments were received on the Scoping Notice.

Reclamation would implement a public involvement plan, in coordination with the City of Klamath Falls, to develop and implement measures to avoid or reduce the adverse effects of construction-related activities on local residents directly or indirectly affected by the project.

This EA has been made available to the interested public prior to a decision regarding a FONSI.

COORDINATION WITH OTHER AGENCIES

Reclamation utilized an interdisciplinary approach to prepare the EA to comply with the mandate of the National Environmental Policy Act (NEPA) to "...utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment" (40 CFR 1501.2(a)). The principal disciplines involved with preparation of the EA were the following resource specialists:

Prepared By:

Jennie Land, Environmental Specialist; Reclamation
Dan Fritz, Senior Environmental Specialist; Reclamation
Archaeologist – Patrick Welch, Reclamation
Fisheries Biologist – Stuart Reid, Service and Mark Buettner, Reclamation
Civil Engineer – Alan Stroppini, Reclamation
Project Manager – Dennis Dorratcague, Montgomery Watson Harza

Representatives of other agencies were also included in the preparation of the EA to provide resource expertise, technical assistance and provide ongoing review and input to the environmental analysis. These agencies include:

Bureau of Reclamation
US Fish and Wildlife Service
State Historic Preservation Office
State of Oregon
Oregon Department of Fish and Wildlife
City of Klamath Falls
US Army Corps of Engineers
Oregon Division of State Lands
Oregon Department of Environmental Quality
Klamath Tribes
Oregon Department of Transportation
PacifiCorp

CHAPTER 5 – REFERENCES CITED

- Buettner, Mark. "A Canal EA." E-Mail to Jennie Land addressing need for inclusion of Bald Eagles in EA. 20 March 2002.
- Guttermuth, B., E. Pinkston and D. Vogel. 2000. A Canal fish entrainment during 1997 and 1998 with emphasis on endangered suckers. Completion report. New Earth/Cell Tech. Klamath Falls, Oregon and Natural Resource Scientists, Inc. Red Bluff, California.
- Montgomery Watson, Inc. 2001. Feasibility Study A Canal Fish Screen. February 2001. Klamath Irrigation District, Klamath Falls, Oregon and Montgomery Watson, Inc., Bellevue, Washington.
- Montgomery Watson Harza. 2001. Feasibility Study Addendum A Canal Fish Screen. December 2001. U.S. Department of the Interior, Mid-Pacific Regional Office, Sacramento, California and Montgomery Watson Harza, Bellevue, Washington.
- Oregon Department of Fish and Wildlife. Letter to Don Treasure, U.S. Bureau of Reclamation. 23 April 1993. Letter regarding reducing fish entrainment.
- Pacific Power. "Link River Trail." Online. www.pacificpower.net/pages/Navigation1127.html/ 20 Feb. 2002.
- Spier, Leslie. 1930. Klamath Ethnography. University of California Publications in American Archeology and Ethnology 30. Berkeley, California.
- Spindor, John. January 1993. Yulalona: A Report On Link River. Klamath Falls, Oregon
- U.S. Bureau of Reclamation. 1994. Biological assessment on long-term project operations. 1994 Klamath Basin Area Office, Klamath Falls, Oregon.
- U.S. Bureau of Reclamation. 2000. Revised Final Environmental Assessment: Clear Lake Dam Modification Safety of Dams Program. October 26, 2000. Klamath Basin Area Office, Klamath Falls, Oregon. (Clear Lake 2000)
- U.S. Bureau of Reclamation. 2001. Final Biological Assessment of Klamath Project Operations on the endangered Lost River sucker and shortnose sucker. February 13, 2001. Klamath Basin Area Office, Klamath Falls, Oregon.
- U.S. Bureau of Reclamation. 2000. Klamath Project Historic Operation. November 2000. U.S. Department of the Interior, Mid-Pacific Region Klamath Basin Area Office, Klamath Falls, Oregon. (Project 2000)
- U.S. Bureau of Reclamation. 2002. Cultural Resources Report. 15 November 2001, 26-27 February 2002. Mid Pacific Regional Office, Sacramento, California. (Cultural 2002)
- U.S. Fish and Wildlife Service. 1992. Biological Opinion of Klamath Project Operations. April 1992. U.S. Department of the Interior, U.S. Fish and Wildlife Service.

- U.S. Fish and Wildlife Service. 2001. Biological Opinion of Klamath Project Operations. April 2001. U.S. Department of the Interior, U.S. Fish and Wildlife Service.
- U.S. Fish and Wildlife Service. 1993. Recovery plan for the Lost River sucker *Deltistes luxatus* and shortnose sucker *Chasmistes brevirostris*. U.S. Department of the Interior, U.S. Fish and Wildlife Service, Region Once, Portland, Oregon. April 1993. 108 pp.
- Vogel, D.A. 1999. November 7, 1999 letter from David Vogel, Natural Resource Scientists, Inc. to Bob Davis, USBR, concerning fish screening options for the A Canal. 1 pp. with attachments.
- Wahl, T. 1999. Hydraulic monitoring in the vicinity of the A Canal in Upper Klamath Lake. Completion Report. USBR, Technical Service Center, Denver, Colorado.
- Welch, P. 2001. December 27, 2001 letter from Patrick Welch, Mid-Pacific Regional Office USBR to Dr. Le Gilsen, State Historic Preservation Office concerning cultural resource issues with the A Canal headworks replacement and fish screen installation.
- Willingham, W.F. 2001. Oregon Inventory of Historic Properties, Section 106 Documentation Form: A Canal Determination of Eligibility for Inclusion in the National register of Historic Places. Archaeological Investigations Northwest, Inc. Letter Report No. 544. Unpublished document on file at the Mid-Pacific Region, Bureau of Reclamation, Sacramento, CA.

APPENDICES

APPENDIX 1

Biological Assessment for the A Canal Fish Screen Project

KO-750
ENV-7.00

MEMORANDUM

To: Steven A. Lewis, Project Leader, U.S. Fish and Wildlife Service
Klamath Falls, Oregon

From: David Sabo
Area Manager

Subject: Request for Formal Consultation on the Effects of the A-Canal Fish Screen and Link River Dam
Fishway Facilities Construction and Operation on Endangered Lost River and Shortnose Suckers

The Bureau of Reclamation (Reclamation) proposes to construct and operate a fish screen facility and fish bypasses and construct a new headworks, at the A Canal, a feature of the Klamath Project. Reclamation also proposes to construct and operate a new fishway facility at Link River Dam.

The attached environmental assessment (EA) titled *A Canal Fish Screen Installation and Headworks Construction-March 25, 2002* describes the underlying need for the portion of the proposed action associated with the A Canal and the details of the proposal to construct a fish screen facility and new headworks. This memorandum incorporates by reference the contents of the EA. One alternative was considered in detail (Proposed Action). Other alternatives were considered but eliminated from further study. Those alternatives are described on page 6 of the EA..

The 2001 Biological Opinion on the effects of Klamath Project operation on endangered suckers requires A-Canal Screening by July 22, 2002 (Reasonable and Prudent Alternative 3a, page 150). Reclamation sent a letter to the Service on August 17, 2001 responding to the April 2001 BO. The letter expressed concern that the specific schedule for completing screening at the A Canal needs to be extended beyond July 2002 to allow adequate time for design and construction activities by Reclamation. Reclamation has agreed to have the fish screen facility constructed and operational by April 1, 2003.

The 2001 BO also requires Reclamation to provide adequate fish passage at Link River Dam by January 1, 2004 (RPA 3b, page 150). Reclamation completed a feasibility study in May 2001, and has developed preliminary designs for a new Link River Dam Fishway.

Reclamation requests initiation of formal consultation on the effects of the Proposed Action on Lost River and shortnose suckers and their proposed critical habitat, and threatened bald eagles. Construction of the fish screen facility is scheduled to begin in August 2002, pending completion of section 7 consultation. Construction of the Link River Dam Fishway is scheduled to begin in July 2003.

Proposed Action

Reclamation proposes to: (1) install a fish screen at the A Canal; remove the existing headworks and construct new headworks downstream of the fish screen; (3) construct a new trash rack structure upstream of the fish screen; (4) construct a new fish bypass bifurcation structure, two fish bypass pipelines capable of sending fish and bypass flows to either Upper Klamath Lake or downstream of Link River Dam and construct a fish evaluation station to monitor and evaluate fish that pass through the fish screen and; (5) remove the existing water measuring flume and replace with a new electronic Doppler flow measuring device. Construction details and schedules are described in the EA.

Reclamation also proposes to: (1) install a fish ladder at Link River Dam and ; (2) a fish trap and hoist at the most

southerly 180 degree bend. Construction is tentatively planned for mid-July 2003 to February 2004. Design drawings and construction details are found in *Preliminary Designer's Operating Criteria/Design Summary - Fish Ladder Link River Dam* and *Link River Dam Fish Ladder Draft Drawings*. This memorandum incorporates these documents by reference the contents of these documents.

Mitigation commitments incorporated into the Proposed Action

The following mitigation commitments would be implemented as part of the Proposed Action:

1. Management practices would be employed during construction activities to minimize environmental effects and will be implemented by Reclamation construction forces or included in construction specifications. Those practices or specifications include sections on public safety, dust abatement, air pollution, noise abatement, water pollution abatement, waste material disposal, erosion control, archaeological and historical resources, vegetation and wildlife.
2. If the proposed action changes significantly from that described in the EA because of additional or new information, additional environmental analyses and compliance may be necessary. For example, if the estimate of spoil material increases or if different spoil, borrow or work areas are required, environmental as well as cost considerations will be included in determining the final location of these areas.
3. Construction of the project would require a Corps of Engineers Clean Water Act-Section 404 Permit, Section 401 state water quality certification and a State of Oregon removal/fill permit for discharges of dredged or fill material into the waters of the United States. Such activities associated with this project could include cofferdams, disposal sites for excavated material or construction material sources. The necessary permits and authorizations would be acquired by Reclamation prior to initiation of construction activities. The conditions and requirements of the 404 Permit will be strictly adhered to by Reclamation. Reclamation would fully mitigate any loss of jurisdictional wetland with appropriate in-basin, in-kind mitigation as determined in consultation with the U.S. Army Corps of Engineers, the State of California and required as a condition of a 404/stream alteration permit. Reclamation will implement adequate wetland mitigation to fully compensate for any impacts to the waters of the United States.
4. A Clean Water Act-Section 402 National Pollutant Discharge Elimination System (NPDES) permit would be required and obtained from the State of California prior to any discharges of water resulting from activities associated with construction of the A Canal fish screen facility and Link River Dam Fishway, if such water is to be discharged as a point source into Upper Klamath Lake or the Link River.
5. In the event that any cultural and/or paleontological site (historic or prehistoric) is discovered, it shall be immediately reported to the Area Manager of the Klamath Basin Area Office. An evaluation of the significance of the discovery will be made by the archaeologist to determine appropriate actions to be taken to prevent loss of significant cultural or scientific value and; (2) any person who knows, or has reason to know, that they have inadvertently discovered human remains on Federal or Tribal lands must provide immediate telephone notification of the inadvertent discovery to the Area Manager at (541) 883-6935. Work will stop until Bureau of Reclamation archaeologists are able to assess the situation onsite. Follow-up actions will comply with the Native American Graves Protection and Repatriation Act (P.L.101-60) of November 1990.
6. All construction activities and appurtenant work (such as borrow sources, waste areas, work, staging and storage areas, and vehicle and equipment parking areas) will be on previously-disturbed areas, to the extent practicable.
7. Existing roads will be used for project activities.
8. There will be no interruption of irrigation deliveries through the A Canal or change in the operation of Upper Klamath Lake to implement this project.
9. Construction sites will be closed to public access—signs or temporary fencing may be installed to prevent public access. Reclamation will coordinate with landowners/permittees and other authorized parties regarding access to or through the project area.
10. All disturbed areas resulting from the project shall be smoothed, shaped, recontoured and rehabilitated to as near

their pre-project construction condition, as practicable. Disturbed areas shall be reseeded with appropriate native seed mixes and at times suitable for successful revegetation after completion of construction and restoration activities. The composition of seed mixes shall be coordinated with the U.S. Fish and Wildlife Service and Oregon Department of Fish and Wildlife.

11. An Environmental Commitment Plan (ECP) and Checklist (ECC) will be prepared and used by the Klamath Basin Area Office to ensure compliance with the environmental commitments and the environmental quality protection requirements. A post-construction environmental summary (PCES) shall be prepared within one year after completion of the project to assess the effectiveness of the mitigation measures.

12. Permits required pursuant to compliance with federal, state, local and tribal environmental protection laws and regulation shall be acquired prior to initiation of ground-disturbing activities. Conditions of such permits shall be fully complied with by Reclamation and/or its designated representative.

Description of the Affected Environment

Two federally listed endangered fish, the Lost River and shortnose suckers inhabit Upper Klamath Lake and Link River. The shortnose sucker (*Chasmistes brevirostris*) and the Lost River sucker (*Deltistes luxatus*) are native and exclusive to the Upper Klamath River basin. They historically were abundant, but are now uncommon. Both species were listed as endangered under the Endangered Species Act in 1988. Upper Klamath Lake, Tule Lake, Gerber Reservoir, Clear Lake and the Klamath River reservoirs (Keno, J.C. Boyle, Copco, and Iron Gate) are habitats for the suckers. These sucker species colonized the Klamath River reservoirs as they were constructed. Both endangered sucker species are predominantly lake-dwelling, and therefore depend heavily upon satisfactory lake water quality conditions for long-term population viability. The suggested reasons for their endangered status includes the damming of rivers, dredging and draining of marshes, water diversions, hybridization, competition and predation by exotic species, insularization of habitat, and water quality problems associated with timber harvest, removal of riparian vegetation, livestock grazing, and agricultural practices.

Upper Klamath Lake has the largest population of endangered suckers in the Klamath Basin. Entrainment of suckers at the A-Canal has been documented as a major component of sucker mortality in Upper Klamath Lake (Gutermuth et al. 2000, USFWS 2001). Most of the entrainment is larval and age 0 (young of the year) juvenile suckers. Entrainment is affected by a variety of factors including: water quality, wind driven currents, habitat availability, diversion rates and timing, random dispersal, active migration, lake levels, Link River reef modifications and others. A detailed review of site-specific information is provided in "A-Canal Entrainment Reduction Alternative Assessment—Decision Support Document" (Reclamation 2002).

Fish passage at Link River Dam has been restricted by an ineffective fish ladder (PacifiCorp 1997). Problems associated with the ladder include: the pool and weir design is inadequate for suckers, there is a lack of attraction flows at the ladder, the ladder is located away from the main flow discharge for the dam, the ladder requires frequent adjustment as lake levels change, and the ladder is located adjacent to the Eastside power canal increasing the risk of entrainment of upstream migrating fish. A detailed review of information pertinent to Link River Dam fish passage is provided in December 1, 2000 (Reclamation 2000).

The federally threatened bald eagle occupies the Upper Klamath basin throughout the year. The basin contains approximately 25% of the nesting bald eagles in Oregon. Bald eagles generally nest in close proximity to lakes and streams including Klamath Project reservoirs (Gerber and Upper Klamath Lake) and forage on fish, waterfowl, small mammals and carrion. During the late fall and winter, as many as 1,000 bald eagles from throughout the Pacific Northwest, western states and Canada migrate into the Upper Klamath basin. The basin contains winter access to food and night-roosting shelter for thermo-regulation and protection from disturbance.

Effects of the Proposed Action on Endangered Suckers and Proposed Critical Habitat

Construction of the A Canal fish screen facility and fish bypasses and headwork facilities and Link River Dam fishway facilities could affect the endangered suckers through:

Introduction of contaminants into waters where suckers are present in either Upper Klamath Lake or the Link River.

Contaminants such as gasoline or diesel fuel, oil, grease, concrete and sediment could be accidentally released into UKL, the A Canal, and/or, the Link River as a result of construction-related activities (such as equipment operation, vehicle fueling and servicing, fuel storage, sediment generated by construction) in the proximity of these water bodies. Accidental spills of these substances could occur and may find their way into the lake or river.

Water turbidity in the immediate area would be temporarily increased during construction activities. Any construction performed in the lake or river would be minor and temporary. All construction in the A Canal will occur after de-watering and salvage activities. All construction activities below Link River Dam will occur after flows decline during the summer.

Required measures to avoid or mitigate this effect: (1) Construction specifications will include restrictions and requirements for fuel storage, fueling and spill prevention/containment; (2) no fuel storage, fueling, vehicle/equipment service areas will be allowed within the flood plain or any other location where contaminants could reach either UKL, the A Canal, and/or, the Link River; (3) no overnight vehicle parking of heavy equipment or other vehicles allowed within the UKL/Link River flood plain; and (4) regular field inspections of compliance with environmental mitigation commitments will be conducted by Reclamation.

Disturbance or modification of proposed critical habitat along the Link River and shoreline of UKL. Removal of a small amount of vegetation would be required for construction of the A Canal fish screen facility and Link River Dam Fishway. Minimal impacts on natural vegetation would occur. No special-status plant species will be impacted. The estimated wetland and riparian area impacted will be cumulatively less than one acre. A wetland delineation will be produced for the entire construction area prior to any construction to determine the amount of wetland and riparian vegetation disturbed by the proposed action. Impacts on endangered suckers and their critical habitat would be minimal.

Cofferdam construction /removal at A Canal headworks and Link River Dam fish ladder construction site. A cofferdam would be constructed immediately upstream of the existing A Canal headworks. It would be constructed of sand bags and plastic sheeting. It would be placed after October 15, 2002 and removed by April 1, 2003. No drawdown of UKL would be required to install the cofferdam or for the project. Fish salvage would be conducted in portions of the A Canal that would be dewatered because of this project (i.e. downstream of existing headworks and the area between the cofferdam and the existing headworks) before initiation of construction activities within the A Canal. The fish salvage would be performed by Reclamation. Reclamation will conduct salvage operations according to a Service approved salvage plan that was submitted in January 2002.

Another cofferdam would be constructed downstream of Link River Dam adjacent to the Keno Canal. It would be constructed of sand bags and plastic sheeting. Fish salvage would be conducted in portions of the Link River that would be dewatered because of the project before initiation of construction activities for the fishway. The fish salvage would be performed by Reclamation according to a Service approved salvage plan.

Construction activity associated with breaching of the cofferdams could impact suckers in Upper Klamath Lake and Link River through localized sediment generated by the breaching, physical disturbance of fish habitat, contact with excavation equipment due to noise, vibration and light changes during construction, or harm to individual suckers as material removed from the coffer dam may fall back into the water.

Required measures to avoid or mitigate this effect: (1) Reclamation and/or the contractor will place barrier nets upstream of existing cofferdams during breaching activities; and (2) the contractor will pump water to the downstream side of existing embankment structure to equalize water levels during excavation of the breach.

Evaluation and Operation of the A Canal Fish Screen Facility

Operation of the fish screen facility may affect endangered suckers through injury and loss of fish passing through the screen facility including the primary pump bypass and secondary gravity bypass, leakage of suckers through the screens, re-entrainment of fish released back to UKL, migration delay, and predation at the primary and secondary bypass outlet locations.

Required measures to avoid or mitigate effects of screen facility operation: (1) Reclamation will monitor flow conditions

along the screen panels (approach and sweeping velocities). Reclamation and/or the contractor will make physical adaptations (baffles, hydraulic vanes, or perforated plates) to modify and improve the hydraulic conditions and distribution of flow proportionally across all screen bays. Adjustments will be made incrementally and tested to make sure the new fish screens are in compliance with the screen criteria in the 2001 BO; (2) Reclamation will conduct fish leakage tests to determine if there are any gaps or holes in the screen. If fish are getting through the screen, gaps will be filled and holes patched; (3) Reclamation will assess re-entrainment rates and report this information to the Service to determine if they are acceptable; (4) Reclamation will evaluate potential injury and loss rates of fish passing through the screening facilities including the primary pump bypass and fish evaluation facility and secondary gravity bypass and report this information to the Service to determine if they are acceptable; and (5) Reclamation will assess if predators are present near the primary and secondary screen bypass outlets and determine if predation is a concern. A detailed A Canal Fish Screen Facility evaluation study plan will be submitted to the Service review and comment before completion of the fish screen facility.

Evaluation and Operation of the Link River Dam Fishway

Operation of the Link River Dam Fishway may affect endangered suckers through blocking passage of juvenile suckers due to relatively high velocities, migration delay, increase the risk of predation in or adjacent to the ladder, and entrainment of suckers into the Eastside and Westside power canals.

Reclamation will use conservative fish passage criteria (4.75% slope, slotted weir baffles, 0.36 feet drop per baffle, 5.0 ft/sec) to ensure velocity and flow characteristics are acceptable to large juvenile and adult suckers. The fishway design has proven successful in other situations where sucker passage was required.

Required measures to avoid or mitigate effects of the Link River Dam fishway facility operation: (1) Reclamation will monitor flow conditions throughout the ladder (velocities and turbulence). Reclamation and/or the contractor will make physical adaptations to modify and improve the hydraulic conditions and distribution of flow through the fishway baffles if necessary to meet passage criteria; (2) Reclamation will assess fall back rates through the Eastside and Westside power canals, and Link River Dam river gates and report this information to the Service to determine if they are acceptable; and (3) Reclamation will assess if predators are present near the fishway facility and determine if predation is a concern. A detailed Link River Dam fishway facility evaluation study plan will be prepared before completion of the facilities for Service review and comment.

Effect of the Proposed Action on Bald Eagles

The nearest bald eagle nest to the A Canal and Link River Dam project sites is over a mile away near Moore Mountain. Construction activities are not likely to affect eagle nesting. However, the 1-2 eagle pairs that nest nearby forage throughout the lower portion of Upper Klamath Lake including the area adjacent to the A Canal and Link River Dam. One or more eagles can be frequently observed perching on the transmission towers about 1/4 mile west of the A Canal and Link River Dam. Reclamation believes that the foraging eagles will continue to forage in the project area because the birds are already acclimated to human activity in this urban setting. During some periods when there is substantial construction noise, the eagles may move to alternate feeding sites nearby. Therefore, construction of the A Canal fish screen and Link River Dam ladder facilities are not likely to affect bald eagles.

Determination of Effects

Reclamation's construction of the A Canal fish screen facility and headworks and Link River Dam fishway may affect, likely to adversely affect endangered Lost River and shortnose suckers as a result of: (1) introduction of contaminants into waters where suckers are present; (2) disturbance or modification of proposed critical habitat (riparian and wetland areas); and (3) breaching the cofferdams. The proposed action would likely result in temporary and short-term adverse effects on endangered suckers that localized.

Based on previous fish salvage operations conducted in the vicinity of the A Canal headworks and below Link River Dam, we anticipate that approximately 300 juvenile suckers and 25 adult suckers will be harassed by the A Canal and Link River Dam construction activities. Lethal take and physical harm is estimated to include 100 juvenile and 10 adult suckers. Approximately 100 feet of critical habitat (riparian and wetland) in UKL and the Link River will

be permanently modified by the construction projects.

The effects of operation of the A Canal fish screen facility and Link River Dam fishway on endangered suckers are unknown. However, Reclamation proposes to evaluate the performance of these facilities for compliance with design criteria, fish passage success, predation rates, and injury and loss rates according to Service approved plans.

The proposed construction of the A Canal fish screen facility and Link River Dam fishway is not likely to effect threatened bald eagles.

Literature Cited

Gutermuth, B, E. Pinkston and D. Vogel. 2000. A Canal fish entrainment during 1997 and 1998 with emphasis on endangered suckers. Completion Report. New Earth/Cell Tech. Klamath Falls, Oregon and Natural Resource Scientists, Inc. Red Bluff, California.

Reclamation (U.S. Bureau of Reclamation) 2000. Link River Dam fish passage project scooping report. Unpublished report. Klamath Basin Area Office, Klamath Falls, Oregon.

Reclamation 2002. A-Canal entrainment reduction alternative assessment –Decision support document. Unpublished report. Klamath Basin Area Office, Klamath Falls, Oregon.

USFWS (U.S. Fish and Wildlife Service). 2001. Biological opinion on effects of Klamath Project Operations. Klamath Falls, Oregon.

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